3. Chin

Program Name: Chin.java Input File: chin.dat

In calculus, there exists an operation called a derivative. This operation will tell you the slope of the curve at a given point. The rules for finding the derivative for a polynomial are very well defined, and rather formulaic. Chin is getting behind on his calculus homework, and he would like you to write an evaluator, that given an equation and the point at which to evaluate it, determines the slope at that point. This means, you will have to take the derivative of the polynomial, as defined by the rules below, and evaluate the new equation produced by taking the derivative, at the point given.

The rules for determining the derivative are as follows:

1. if there is a term without an x in it, remove it
2. if there is a multiplication, e.g., ***a* * *x***, keep only the coefficient, e.g., ***a***. (Note, x / 7 is equivalent to (1 / 7.0) * x)
3. if there is an exponent, e.g., ***a* * *x*^*b***, multiple the x by the exponent, and reduce the value of the exponent by 1, e.g., ***a* * *b* * *x* ^ (*b*-1)**.

Following these rules in the equation: **5 * x^4 + 3 * x + 2** gives us:

By rule 1, the “ **+ 2**” at the end is removed. By rule 2, “**3 * x**” becomes “**3**”. By rule 3, the “**5 * x^4**” becomes “**5 * 4 * x^3**”.

All of Chin’s equations will be exponents (^), multiplication (*), divisions (/), subtractions (-), and additions (+). All coefficients and exponents will be integers. There will be no parenthesis or brackets and typical order of operations do apply.

Input: The first integer will represent the number of data sets to follow. The first line of the dataset will be the polynomial Chin wants you to take the derivative of. The second line of each data set will be one floating point number that will be the point (value of x) at which to evaluate the expression derived.

Output: For each output, display the value of the derivative of the given polynomial evaluated at the given point, rounded to two decimal places.

Assumptions: All multiplications, additions, subtractions, and divisions will be separated by a space. All values will be positive.

Sample Input:

```
3
5 * x^2 + x / 7 + 9
1372.3
7 * x^3 + 7 * x + 15
100.1
1 / 7 + 17 + 9 * x + 15 * x^3
0.0
```

Sample Output:

```
13723.14
210427.21
9.00
```